SPACE COOPERATION

Tropical Rainfall Measuring Mission

Agreement Between the
UNITED STATES OF AMERICA
and JAPAN

Effected by Exchange of Notes at
Washington May 30, 1997

and

Memorandum of Understanding
Signed at Washington October 20, 1995
with
Agreement amending Memorandum of Understanding
Signed at Tokyo June 2, 1997

and

Agreement Extending the Agreement of May 30, 1997
Effected by Exchange of Notes at
Washington May 28, 2002
and
Agreement Extending the Agreement of May 30, 1997
Effected by Exchange of Notes at
Washington May 22, 2008

NOTE BY THE DEPARTMENT OF STATE

Pursuant to Public Law 89—497, approved July 8, 1966 (80 Stat. 271; 1 U.S.C. 113)—

". . .the Treaties and Other International Acts Series issued under the authority of the Secretary of State shall be competent evidence . . . of the treaties, international agreements other than treaties, and proclamations by the President of such treaties and international agreements other than treaties, as the case may be, therein contained, in all the courts of law and equity and of maritime jurisdiction, and in all the tribunals and public offices of the United States, and of the several States, without any further proof or authentication thereof."

JAPAN

Space Cooperation: Tropical Rainfall Measuring Mission

Agreement effected by exchange of notes at Washington May 30, 1997;
Entered into force May 30, 1997.
And memorandum of understanding signed at Washington October 20, 1995;
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With agreement amending the memorandum of understanding.
Signed at Tokyo June 2, 1997;
Entered into force June 2, 1997.
And agreement extending the agreement of May 30, 1997.
Effected by exchange of notes at Washington May 28, 2002;
Entered into force May 28, 2002.
And agreement extending the agreement of May 30, 1997.
Effected by exchange of notes at Washington May 22, 2008;
Entered into force May 22, 2008.

DEPARTMENT OF STATE
WASHINGTON

May 30, 1997

Excellency,

I have the honor to refer to the recent discussions between representatives of the Government of the United States of America and of the Government of Japan concerning the cooperation between the National Aeronautics and Space Administration of the United States of America (hereinafter referred to as "NASA") and the National Space Development Agency of Japan (hereinafter referred to as "NASDA") on the Tropical Rainfall Measuring Mission Program (hereinafter referred to as "the Program"), which will be undertaken by NASDA as a part of the "Basic Program concerning Space Development" of the Government of Japan.

In consideration of the continuing mutually beneficial relationship between the two Governments in the field of peaceful exploration and use of outer space; taking into account the Agreement between the Government of the United States of America and the Government of Japan on Cooperation in Research and Development in Science and Technology, signed at Toronto, on June 20, 1988, as extended; and reaffirming that the provisions of the Agreement between the Government of the United States of America and the Government of Japan Concerning Cross-Waiver of Liability for Cooperation in the Exploration and Use of Space for Peaceful Purposes, signed at Washington, on

His Excellency

Kunihiko Saito,

Ambassador of Japan.

April 24, 1995, and the Exchange of Notes of the same date between the two Governments concerning subrogated claims shall apply to the Program, I have further the honor to propose on behalf of the Government of the United States of America the following:

1. The cooperation between NASA and NASDA mentioned above will be conducted in accordance with the terms and conditions of implementing arrangements (Memorandum of Understanding, hereinafter referred to as "the MOU") agreed between NASA and NASDA for the development and operation of an observatory satellite to measure tropical rainfall, its launch by an H-II launch vehicle, and related scientific activities.

2. The provisions of the MOU will be implemented in accordance with the laws and regulations in force in each country. Activities under the MOU will be undertaken subject to the availability of appropriated funds.

3. Unless otherwise agreed, the Government of the United States of America shall register the satellite referred to in paragraph 1 above in accordance with the provisions of the Convention on Registration of Objects Launched into Outer Space, done at New York, on January 14, 1975.

4. The Government of the United States of America and the Government of Japan shall consult with each other on any matter that may arise from or in connection with the Program with a view to finding a mutually acceptable solution.

5. The present arrangements shall remain in force for five years, unless terminated by either Government upon six

months' written notice of its intention to terminate them through diplomatic channels. The present arrangements may be extended or amended by mutual written agreement of the two Governments.

I have further the honor to propose that, if the foregoing is acceptable to the Government of Japan, this Note and Your Excellency's Note in reply shall constitute an agreement between the two Governments, which will enter into force on the date of Your Excellency's reply.

Accept, Excellency, the renewed assurances of my highest consideration.

For the Secretary of State:

Ellen Clauser

EMBASSY OF JAPAN
WASHINGTON, D.C.

May 30, 1997

Excellency,

I have the honor to acknowledge the receipt of Your Excellency's Note of today's date which reads as follows:

"I have the honor to refer to the recent discussions between representatives of the Government of the United States of America and of the Government of Japan concerning the cooperation between the National Aeronautics and Space Administration of the United States of America (hereinafter referred to as "NASA") and the National Space Development Agency of Japan (hereinafter referred to as "NASDA") on the Tropical Rainfall Measuring Mission Program (hereinafter referred to as "the Program"), which will be undertaken by NASDA as a part of the "Basic Program concerning Space Development" of the Government of Japan.

In consideration of the continuing mutually beneficial relationship between the two Governments in the field of peaceful exploration and use of outer space; taking into account the Agreement between the Government of the United States of America and the Government of Japan on Cooperation in Research and Development in Science and Technology, signed at Toronto, on June 20, 1988, as extended; and reaffirming that the provisions of the Agreement between the Government of the United States of America and the Government of Japan Concerning Cross-Waiver of Liability for Cooperation in the Exploration and Use of Space for Peaceful Purposes, signed at Washington, on April 24, 1995, and the Exchange of Notes of the same date between the two Governments concerning subrogated claims shall apply to the Program, I have further the honor to propose on behalf of the Government of the United States of America the following :

1. The cooperation between NASA and NASDA mentioned above will be conducted in accordance with the terms and conditions of implementing arrangements (Memorandum of Understanding, hereinafter referred to as "the MOU") agreed between NASA and NASDA for the development and operation of an observatory satellite to measure tropical rainfall, its

launch by an H-II launch vehicle, and related scientific activities.

2. The provisions of the MOU will be implemented in accordance with the laws and regulations in force in each country. Activities under the MOU will be undertaken subject to the availability of appropriated funds.

3. Unless otherwise agreed, the Government of the United States of America shall register the satellite referred to in paragraph 1 above in accordance with the provisions of the Convention on Registration of Objects Launched into Outer Space, done at New York, on January 14, 1975.

4. The Government of the United States of America and the Government of Japan shall consult with each other on any matter that may arise from or in connection with the Program with a view to finding a mutually acceptable solution.

5. The present arrangements shall remain in force for five years, unless terminated by either Government upon six months' written notice of its intention to terminate them through diplomatic channels. The present arrangements may be extended or amended by mutual written agreement of the two Governments.

I have further the honor to propose that, if the foregoing is acceptable to the Government of Japan, this Note and Your Excellency's Note in reply shall constitute an agreement between the two Governments, which will enter into force on the date of Your Excellency's reply."

I have further the honor to confirm on behalf of the Government of Japan that the foregoing is acceptable to the Government of Japan and to agree that Your Excellency's Note and this Note in reply shall constitute an agreement between the two Governments, which will enter into force on the date of this reply.

Accept, Excellency, the renewed assurances of my highest consideration.

For the Ambassador Extraordinary
and Plenipotentiary of Japan

M. Shibuya

Her Excellency
Madeleine Korbel Albright
The Secretary of State

Amendment to the Memorandum of Understanding between The National Space Development Agency of Japan and The National Aeronautics and Space Administration of the United States of America For Joint Development of the Tropical Rainfall Measuring Mission

The National Space Development Agency of Japan (hereinafter referred to as "NASDA") and the National Aeronautics and Space Administration of the United States of America (hereinafter referred to as "NASA"),

Recalling the relevant provisions of the Exchange of Notes between the Government of the United States of America and the Government of Japan concerning Tropical Rainfall Measuring Mission (TRMM), which entered into force on May 30, 1997,and the Memorandum of Understanding between the National Space Development Agency of Japan and the National Aeronautics and Space Administration of the United States of America for Joint Development of the Tropical Rainfall Measuring Mission, which was signed as of October 20, 1995 (hereinafter referred to as "original MOU");

Have agreed on an amendment to the original MOU, pursuant to Article XXI of the original MOU, as follows:

1. The Appendix shall be replaced by a new section called "Definitions," and the Contents on page 2 of the original MOU shall be revised accordingly.

2. The ninth paragraph in the Preamble of the original MOU shall be replaced by the following paragraph:
   "Noting that NASA and NASDA will share data from TRMM for research, operational and other uses under the terms contained in this MOU."

3. The paragraph 5. a in Article III of the original MOU shall be replaced by the following paragraph:

"a. Design, develop, and operate the NASA TSDIS to capture, produce, distribute, and archive all mission data in accordance with the principles stipulated in Article VIII."

4. The paragraph 5.a in Article IV of the original MOU shall be replaced by the following paragraph:

"a. Design, develop, and operate the NASDA TRMM data system to capture, produce, distribute and archive all PR mission and other sensor mission data, as mutually agreed, in accordance with the principles stipulated in Article VIII."

5. Article VIII of the original MOU shall be replaced in its entirety by the following article:

"Article VIII - Data Distribution

1. NASA and NASDA shall share all TRMM data and make such data available to other users for research, operational and other uses under the terms of the principles below. The shared data shall include all products from the NASA-provided instruments, the NASDA-provided instrument, and ground truth data used to validate the TRMM products.

2. For the purposes of this MOU, NASA and NASDA are joint Data Providing Agencies (DPAs) for the TRMM instrument data and agree that such data shall be distributed to all users without restriction, in a manner consistent with applicable laws and regulations.

A. All TRMM data will be available for the use of each of the Parties and their designated users at the lowest possible cost for noncommercial use in the following categories: Research, Applications, and Operational Use for the Public Benefit.

B. Parties which designate users for Research Use and for Applications Use will do so through an Announcement of Opportunity or similar process. The designation will include a definition of the data to be provided. Research Users

shall be required to submit their results for publication in the scientific literature and Applications Users shall be required to publish their results in a technical report and both shall be required to provide their results to both Parties.

C. Either of the Parties may designate national users as it deems appropriate to be given access to all TRMM data at the lowest possible cost for Non-commercial Operational Use for Public Benefit, provided the designating Party assumes responsibility for ensuring that all the terms and conditions for data use are met. This use will have to be reported to the Data Providing Agency on the basis of commonly agreed criteria including type, usage, and final destination of data. Designation of users outside the national territory of the Parties (e.g., international organizations and agencies in non-participating countries) for Non-commercial Operational Use for the Public Benefit will be done only with the agreement of the Data Providing Agency.

D. For purposes other than A above, the specified data will be made available in accordance with terms and conditions to be established by the Data Providing Agency.

E. Each Party will fulfill the data requests of the other Party, and its designated users to the maximum extent possible. In the event that these data requests exceed the Data Providing Agency's capacity, the Data Providing Agency and the designating Party will pursue alternative arrangements to fulfill such requests.

F. All data required by the Parties and their designated users will be made available on condition that the recipient agrees to applicable intellectual property rights terms and conditions and/or proprietary rights consistent with this Article, and ensures that the data shall not be distributed to non-designated parties, nor used in ways other than those for which the data were provided, without the written consent of the Data Providing Agency.

G. Either of the Parties may designate some of its functions to other entities, in which case, such Party will remain responsible for ensuring compliance with this Article.

H. The Parties will harmonize criteria and priorities for data acquisition,

archiving, and purging, in consultation with other relevant organizations.

3. NASA and NASDA shall each create and maintain a catalogue of TRMM data acquired and processed at their facilities, exchange this information by means of standardized formats, and make it freely available to users. NASA and NASDA shall establish interoperative capability between their respective catalogue systems.

4. The analyzed results from TRMM shall be made available to the general scientific community through publication in appropriate journals or presentations at scientific conferences as soon as possible and consistent with standard scientific practices. The publication shall indicate thereon, as appropriate, that the publication is based on results obtained from the joint NASA-NASDA TRMM mission. Each Party shall take necessary measures that NASA, NASDA or their related researchers shall provide a copy of reports and/or publications to the other Party freely. And in the event such reports or publications are copyrighted, both Parties shall take necessary steps that NASA and NASDA shall be granted a royalty free right under the copyright to reproduce, use, and distribute such copyrighted work for their purpose by the copyright holder. "

6. The first paragraph of Article XXII of the original MOU shall be replaced by the following paragraph:

"1. This MOU shall enter into force upon its signature by the Parties. This MOU shall remain in force until the Notes concerning TRMM exchanged on May 30, 1997 between the Government of the United States of America and the Government of Japan are terminated. This MOU may be extended by mutual written agreement provided that the Notes referred to above are extended for the same period."

7. The Appendix shall be replaced with "Definitions" which shall contain the following:

"Definitions

Applications Use of data is a limited proof of concept study toward: 1) the solution of an applied program to demonstrate the utility of the data; or 2) the

demonstration of the operational use of data.

Data refers to original Earth observation sensor output and higher level products created from it by the Data Providing Agency as part of the standard set of products.

Data Providing Agency is the Agency which has primary responsibility for the distribution of data from a particular instrument or is the owner of such data. The Data Providing Agency will be defined in agreements between the operator of the platform carrying the instrument and the instrument provider should the two be different organizations.

Lowest Possible Cost for designated users is no more than the additional cost of resources, above the cost of the normal planned data system operations, required to fill a specific user request. These costs may include media, labour, expenses for operating and maintaining equipment, as well as delivery charges for mail or electronic transmission. The above costs should not include non-recurring costs such as research, development, and space segment capital cost. However, it may include a reasonable amount towards additional capital cost of data provision.

Non-commercial Use is the utilization of data to provide a service for the public benefit as distinguished from conferring an economic advantage on a particular user or group of users.

Non-commercial Operational Use for the Public Benefit is the utilization of data to provide a regular service for the public benefit as distinguished from conferring an economic advantage on a particular user or group of users. An example is the use of data to carry out a mandate of environmental observation and prediction. These activities can be carried out by national or international agencies or other entities designated by these agencies to support their public benefit mandate. Such a user may be requested by the Data Providing Agency and/or the designating Agency to provide a periodic status report back to them.

Non-discriminatory Basis means that all users in a clearly defined data use category can obtain data on the same terms and conditions, and the categories are defined in such a way that all potential users will be included in categories with

access to the data.

Research Use of data is utilization of data in a study or investigation which aims to establish facts or principles."

8. This Amendment shall come into force on the date of latter signature hereof.

IN WITNESS WHEREOF, NASDA and NASA have caused their duly authorized representatives to execute two originals of this amendment in the English language.

For the National Space Development Agency of Japan:

Isao Uchida
President

Date : June 2, 1997
Place: Tokyo

For the National Aeronautics and Space Administration of the United States of America:

Daniel S. Goldin
Administrator

Date : June 2, 1997
Place: Tokyo

Memorandum of Understanding

between the

National Aeronautics and Space Administration

of the United States of America

and the

National Space Development Agency of Japan

For Joint Development of the

Tropical Rainfall Measuring Mission

CONTENTS

Preamble

The National Aeronautics and Space Administration of the United States of America (hereinafter referred to as "NASA) and the National Space Development Agency of Japan (hereinafter referred to as "NASDA"), together hereinafter referred to as "the Parties",

Recognizing that tropical rainfall is essential to the distribution of water throughout the Earth system, and over two-thirds of the worldwide precipitation occurs in the tropics, releasing the energy that helps to power the global atmospheric circulation, which shapes both weather and climate;

Recognizing that tropical rainfall also plays a key role in the sporadic "El Nino" climate anomalies that trigger floods and droughts around the world, and measuring tropical rainfall from the Earth's surface is difficult because of its high variability, and moreover, surface observations are not feasible over the vast ocean and jungle regions of the tropics;

Noting that advances in technology now make it possible to obtain these essential measurements from space;

Considering that in 1972, the first imaging microwave radiometer orbits on NASA's Nimbus-5 gave evidence that instantaneous rainfall rates could be measured from space, and in the early 1980's, the Communications Research Laboratory of Japan (hereinafter referred to as "CRL") developed an airborne microwave radar and radiometer system to investigate the interference of rain in satellite-to-ground communications;

Recalling that in 1986, the Tropical Rainfall Measuring Mission (TRMM) Science Steering Group, a team of experts in atmospheric, oceanic, and remote sensing sciences, began investigating the scientific justification and implementation process of a satellite mission to study systematically tropical rainfall, and in early 1987, NASA, NASDA, and CRL instituted a study of the feasibility of implementing TRMM as a joint space project;

Considering that the resulting three-year TRMM mission is a part of a systematic, integrated program designed to increase the extent and accuracy of rainfall and latent heat measurements and provide strides in weather and climate research;

Noting that the goals of TRMM are as follows:

(1) to advance the Earth System Science objective of understanding the global energy and water cycle by means of providing distributions of rainfall and inferred heat over the global tropics;

(2) to understand the mechanisms through which tropical rainfall and its variability influence global circulation and to improve our ability to model these processes in order to predict global circulation and rainfall variability at monthly and longer time scales; and

(3) to evaluate a space-based system for rainfall measurement; and

Noting that NASA and NASDA will share data from TRMM for research, operational and other uses under the terms of the International Earth Observing system (IEOS) Data Exchange Principles (DEP) contained in the Appendix to this MOU;

Considering the above mentioned circumstances, have agreed as follows:

Article I - Purpose

The Purpose of this Memorandum of Understanding (hereinafter referred to as the "MOU") is to establish the terms and conditions under which NASA and NASDA will cooperate in the joint development, launch, operations and use of the Tropical Rainfall Measuring Mission (hereinafter referred to as "TRMM") for peaceful purposes.

Article II - Mission Description and Participation

1. The primary objective of the TRMM Project is to measure the distribution and variability of tropical rainfall and latent heat releases on a monthly basis for three years to advance the scientific understanding of the global energy and water cycles.

2. Accordingly, an observatory (hereinafter referred to as the "TRMM Observatory"), consisting of a satellite to be provided by NASA, carrying four NASA-provided instruments and one NASDA-provided instrument, is planned for launch in 1997. The TRMM Observatory shall be launched using an H-II launch vehicle provided by NASDA for injection into a near-circular orbit at a nominal initial altitude of 380 kilometers with an inclination of 35 degrees. Launch shall be from the Yoshinobu Launch Complex of NASDA's Tanegashima Space Center located on the Tanegashima Island of Japan (hereinafter referred to as the "launch site").

3. After an initial checkout period and a reduction in altitude to 350 kilometers, the TRMM Observatory is planned to be operated for three years at a nominal altitude of 350 km. The TRMM Observatory shall be operated by NASA utilizing its Tracking and Data Relay Satellite System (TDRSS) for command, control, data acquisition, and routine tracking. Science data received at the NASA Goddard Space Flight Center (GSFC) shall be processed by the TRMM Science Data and Information System (TSDIS) and the Earth Observing System Data and Information System (EOSDIS). Science data will also be sent to the NASDA Earth Observation Center and processed by the TRMM Data Processing System and Earth Observation Information

System (EOIS). The NASDA-provided Communications and Broadcasting Engineering Test Satellite (COMETS) shall be included in an experimental manner to relay mutually selected mission data from the TRMM Observatory to the Japanese ground station located at Tsukuba, Japan.

Article III - NASA Responsibilities

To implement this cooperative program, NASA shall use its best efforts to carry out the following responsibilities:

1. Development of Instruments

Design, develop, produce, calibrate and space-qualify the following rainfall instruments which, together with the NASDA-provided Precipitation Radar (PR) are primary to the TRMM mission success criteria:

a. TRMM Microwave Imager (TMI)
b. Visible Infrared Scanner (VIRS)

In addition, design, develop, produce, calibrate and space-qualify the following EOS instruments, which are Flights of Opportunity for the NASA EOS Program.

c. Clouds and Earth's Radiant Energy System (CERES)
d. Lightning Imaging Sensor (LIS)

These four instruments together will be referred to as the "NASA-provided instruments." The TMI and VIRS together with the PR will be referred to as the "rainfall instruments" and data obtained from these instruments will be referred to as the "rainfall data."

2. Development of and Integration of Instruments with the TRMM Spacecraft

a. Design, develop, produce, and space-qualify the TRMM spacecraft;

b. Integrate the NASA-provided instruments and the NASDA-provided Precipitation Radar (PR) with the TRMM spacecraft to create the TRMM Observatory;

c. Provide NASDA with a spacecraft interface simulator designed to verify the PR-to-spacecraft interfaces with regard to command and data handling software, optical signals, bus hardware, and the non-optical functions;

d. Provide NASDA with a TRMM spacecraft-to-PR drill template and a set of test kinematic mounts;

e. Obtain all necessary national and international radio frequency approvals for TRMM for U. S. territory and in-orbit operations at the appropriate time;

f. Provide NASDA with a NASA User Test System designed to show TRMM/COMETS system compatibility with regard to command and telemetry data; and

g. Provide necessary support to NASDA for the import of test pyrotechnic devices into the United States.

3. Shipping and Launch Site Activities

a. Provide all shipping and handling of the TRMM Observatory until the TRMM Observatory is handed over to NASDA for H-II integration, and package and ship the TRMM Observatory, including the test equipment needed at launch, to the launch site;

b. Perform all required post-shipping tests of the TRMM Observatory at the launch site;

c. Perform the radio-frequency (RF) end-to-end test at the launch site for command and telemetry flow;

d. Support NASDA in its application for the Reaction Control System (RCS) special loading license, as necessary;

e. Provide the hydrazine fueling and pressurization of the Reaction Control System (RCS) of the TRMM Observatory ;

f. Support a mutually-agreed-upon integration and test program for the TRMM Observatory, with the H-II launch vehicle;

g. Determine TRMM Observatory readiness for launch;

h. Maintain a launch team at the launch site to perform all observatory-related launch activities; and

i. Pack and ship all materials to be returned from the launch site to GSFC.

4. Operation after the Separation of the TRMM Observatory from the Launch Vehicle

a. Control the TRMM Observatory after separation from the launch vehicle, which includes control and monitoring of all instruments including the PR;

b. Utilize and operate the TDRSS and GSFC institutional support facilities for communications, tracking, telemetry and command links to the TRMM Observatory;

c. Utilize and operate the Mission Operations Center at GSFC to support the operation of the TRMM Observatory and to assure successful mission control;

d. Perform an initial on-orbit check-out of the TRMM Observatory with NASDA supporting the planning and data analysis for the PR checkout;

e. Plan and conduct the operation of TRMM including the PR with the support of NASDA for PR planning and PR engineering data analysis;

f. Plan and conduct calibration and validation to verify performance of NASA-provided instruments;

g. Operate the TRMM Observatory as required to perform mutually-agreed-upon telemetry, tracking and command and science data experiments designed to demonstrate successfully the capability of NASDA's COMETS data relay satellite and meet Space Network Interoperability Panel (SNIP) demonstration testing objectives; and.

h. Operate the TRMM Observatory after the 3 year mission life for possible extended duration. Termination of the operation and the disposal of the TRMM Observatory shall be decided with agreement from NASDA.

5. Data System

a. Design, develop, and operate the NASA TSDIS to capture, produce, distribute, and archive all mission data in accordance with the International Earth Observing System (IEOS) Data Exchange Principles (DEP) in the Appendix;

b. Provide all PR housekeeping data and other data necessary to check the PR status, as mutually agreed;

c. Receive TRMM mission data at White Sands Complex (WSC) and produce TRMM Level Zero Processed (LZP) data.

d. Provide LZP data, NASDA-requested Quick Look (QL) data, NASA-provided instrument calibration data and the other necessary data to perform data processing at NASDA, as mutually agreed;

e. Provide the higher level products other than LZP data to NASDA when available, as mutually agreed;

f. Provide ground truth data to NASDA, as mutually agreed;

g. Provide NASDA with NASA algorithms used to generate standard products, as mutually agreed;

h. Provide NASA's catalogue data to NASDA, as mutually agreed; and

i. Establish the network interfaces mutually agreed with NASDA for providing some of mission data, mission operation information through EOSDIS-EOIS communication lines.

6. Safety

NASA shall comply with NASDA's safety requirements and safety instructions, with assistance from NASDA.

7. Other

a. Develop and maintain instrument-to-spacecraft interface control specifications, mission specifications, Operation and Interface Specification (OIS), and flight operation plans, as detailed in the TRMM Implementation Plan (TRMM IP);

b. Hold meetings and reviews periodically in the United States of America, as required and mutually agreed, to carry out the responsibilities set forth by this MOU;

c. Exchange personnel and information with NASDA, as needed, to address engineering, operations, and science issues; and

d. Consult with NASDA on arrangements related to radio-frequency interference issues.

Article IV - NASDA Responsibilities

To implement this cooperative project, NASDA shall use its best efforts to carry out the following responsibilities:

1. Development of Instrument

   a Design, develop, produce, calibrate, and space-qualify the PR;

   b. Provide all shipping and handling of the PR from Japan to the integration site at GSFC, including the test equipment required for integration and testing at GSFC;

   c. Perform all post-shipping tests of the PR at the integration site (GSFC), as mutually agreed;

   d. Support a mutually-agreed-upon integration and test program of the PR with the TRMM Observatory; and

   e. Pack and ship the PR ground support equipment (GSE) to be returned from GSFC to Japan.

2. Development of Launch Vehicle and Launch Site Facilities

   a Design, develop, produce and space-qualify the H-II launch vehicle including the Payload Attach Fitting (PAF);

   b. Deliver a test PAF to the GSFC for NASA to perform structural test and integration test of the TRMM Observatory;

   c. Deliver a flight PAF to GSFC to perform interface testing of the H-II and the TRMM Observatory and transport the flight PAF to the launch site for integration with the TRMM Observatory;

   d. With the support of NASA, provide six test pyrotechnic devices; and

   e. Provide the facilities required at the launch site to perform all launch operations, as mutually agreed.

3. Shipping and Launch Site Activities

   a. Provide the launch vehicle including the launch vehicle test equipment required at the launch site;

b. With NASA support, integrate the TRMM Observatory with the H-II launch vehicle;

c. Perform launch operations of the launch vehicle at the launch site;

d. Provide NASA with Self Contained Atmosphere Protection Equipment (SCAPE) suits for hazardous operations, as mutually agreed;

e. Provide necessary support to NASA for transportation and launch site activities in Japan related to the TRMM Observatory, as mutually agreed;

f. Provide real-time launch operation information to the designated NASA data pick-up point at a mutually-agreed-upon point, as mutually agreed;

g. Support the RF end-to-end test, including obtaining all necessary radio frequency approvals required by the Government of Japan;

h. Apply for Reaction Control System (RCS) special loading license with support from NASA and support NASA in the RCS hydrazine fueling and pressurization, as mutually agreed;

i. Determine when all launch systems are ready for launch; and

j. Launch the TRMM Observatory to the mutually-agreed-upon insertion orbit and deploy the TRMM Observatory from the launch vehicle.

4. Operation after the Separation of the TRMM Observatory

a. Support planning and data analysis for PR initial on-orbit check-out;

b. Integrate PR operation requests and support NASA's planning and conducting of PR operations including data analysis to verify proper instrument operations;

c. Utilize and operate the COMETS Data Relay Satellite and Tsukuba Space Center/NASDA to perform mutually-agreed-upon TRMM/COMETS data relay capability experiments; and

d. Plan and conduct calibration and validation to verify performance of the PR.

5. Data Systems

a. Design, develop, and operate the NASDA TRMM data system to capture, produce, distribute and archive all PR mission data and other sensor mission data, as mutually agreed, in accordance with the IEOS DEP in the Appendix;

b. Provide the processed data of PR and other sensor products to NASA, as mutually agreed, when available;

c. Provide NASA with the PR calibration data and ground truth data, as mutually agreed;

d. Provide NASA with NASDA algorithms used to generate standard products, as mutually agreed;

e. Provide NASDA's catalogue data to NASA, as mutually agreed; and

f. Establish the network interfaces mutually agreed with NASA for providing the mission operation information through EOSDIS-EOIS communication lines.

6. Safety

NASDA is responsible for the overall safety control of the launch, including the TRMM launch operation at Tanegashima Space Center performed by NASA. NASDA shall assist NASA in its efforts to comply with Japanese safety regulations.

7. Other

a Develop and maintain spacecraft-to-launch vehicle Interface Control Specifications (ICS), launch operation ICS, TRMM/COMETS ICS, a TRMM/COMETS experiment plan and procedure, and PR Instrument Operation Documents as detailed in the TRMM IP;

b. Hold meetings and reviews periodically in Japan, as required and mutually agreed, to carry out the responsibilities set forth by this MOU;

c. Exchange personnel and information with NASA, as needed, to address engineering, operations, and science issues; and

d. Provide necessary support to NASA on arrangements related to radio-frequency interference issues.

Article V - Program and Project Management

1. NASA shall establish a TRMM Project Office to provide for project planning and management. This office shall be responsible for the overall design, fabrication, test, calibration, integration, on-orbit verification, operation, and data delivery of TRMM. The Project Office shall be headed by a Project Manager appointed by NASA. During the integration and testing (I&T) phase and once the spacecraft is in orbit, responsibility for the daily management of the TRMM Project, within the mutually-established TRMM Program requirements, resides with the NASA TRMM Project Manager. The NASA Program Manager shall be responsible for the U.S. TRMM Program, including funding advocacy and interfaces with supporting NASA Programs such as EOS/EOSDIS.

2. NASDA shall establish a TRMM Project Office headed by a Project Manager, who shall be responsible for overall design, fabrication, test, delivery, and on-orbit verification of the PR instrument. The NASDA Program Manager shall be responsible for the Japanese TRMM program, including launch services, launch of TRMM by the H-II, and data delivery of the PR instrument.

3. The NASA Project Manager shall prepare, in close coordination with the NASDA Project Manager, a TRMM IP, which shall then be subject to approval by the NASA and NASDA Program and Project Managers. This TRMM IP addresses the following areas of responsibility for each Party: program/project management, schedules, interface requirements, design analysis, data processing, launch operations, flight and mission operations, TRMM/COMETS data relay capability experiments, science requirements, testing, performance assurance, logistics, deliverables/documentation, reviews, and meetings. In case of conflict between the TRMM IP and the MOU, the MOU shall prevail. Changes to the TRMM IP shall require the approval of the respective Program and Project Managers.

4. A TRMM Joint Steering Group (JSG) shall be jointly established by both parties to provide overall program guidance, to review project implementation status, and to resolve issues beyond the managerial scope of the respective Project Managers. The TRMM JSG shall be co-chaired by the NASA and NASDA TRMM Program Managers, and shall include NASA and NASDA TRMM Project Managers, the NASA and NASDA TRMM Program and Project Scientists, the GSFC Director of Flight Projects and the NASDA Director of Earth Observation Satellite Department, and such other members as agreed by the two Program Managers. Decisions at the JSG shall be taken by consensus of the members.

5. If the TRMM Project Managers are unable to come to an agreement on a particular issue, the issue shall be brought before the TRMM JSG for resolution. In the event that the TRMM JSG is unable to resolve a particular issue that issue shall be resolved in accordance with Article XIX.

Article VI - Scientific Investigations

1. In order to meet the science goals of the TRMM program, NASA, NASDA and both Parties may establish a NASA-selected TRMM Science Team, a NASDA-selected TRMM Science Team, and a Joint TRMM Science Team (composed of 6-7 scientists from each Science Team, selected by the respective Program Scientists). NASA, NASDA and both Parties shall have the Science Teams act as advisory bodies to the NASA and NASDA Program/Project Managers for the definition and maintenance of science requirements for TRMM, including the TRMM science data systems, TRMM algorithm development, and validation of TRMM standard data products.

2. NASA ensures and NASDA acknowledges as follows: The U.S. TRMM Science Team is responsible for advising the NASA Program/Project Managers on the U.S. scientific requirements for TRMM, the science requirements for the NASA science data system, and for the algorithm development and validation of the standard U.S. products subject to the approval of the Joint Science Team. The U.S. Science Team is also responsible for monitoring the development of the TMI and VIRS and reporting issues that affect science to the Joint TRMM Science Team. The U.S. Science Team shall arrange for ground truth data to be collected and processed into the NASA science data system. The U.S. Science Team is responsible for consulting with their counterparts on the Japan Science Team when requirements change. The U.S. Science Team is also responsible for responding within an appropriate time to requests for consultation from the Japan Science Team.

3. NASDA ensures and NASA acknowledges as follows: The Japan TRMM Science Team is responsible for advising the NASDA Program/Project Managers on the Japanese scientific requirements for TRMM, and the science requirements for the Japan science data system, and for the algorithm development and validation of the standard Japan data products, subject to the approval of the Joint TRMM Science Team. The Japan Science Team is also responsible for monitoring the development of the PR and reporting issues that affect science to the Joint TRMM Science Team. The Japan Science Team shall establish a Japan-side ground validation plan and cooperate with NASDA on the ground truth data collection and processing by the NASDA data system. The Japan Science Team is responsible for consulting with its counterparts on the U.S. Science Team when requirements change. The Japan Science Team is also responsible for responding within an appropriate time to requests for consultation from the U.S. Science Team.

4. Both Parties ensure each other and acknowledge as follows: The Joint TRMM Science Team is responsible for advising the NASA and NASDA Program/Project Managers on defining the joint scientific requirements for TRMM. The Joint Science Team shall recommend the science requirements for the NASDA and NASA science data processing systems and for the algorithm development and validation of the joint standard data products.

Specifically, the Joint TRMM Science Team has responsibility to:

a. Recommend the overall scientific requirements, in terms of mission science, spacecraft and instrument performance, spacecraft operation, instrument operation and calibration, scientific data, scientific data processing, algorithm development and validation, and all higher-level (L1-L3) data products generated by the NASA and NASDA science data systems;

b. Recommend the procedures for science data processing, the update of working standard algorithms, and the TRMM Observatory operation plan;

c. Review the TRMM Observatory (including instruments) performance and functions to determine if the overall scientific requirements are met;

d. Ensure that both the U.S. Science Team and the Japan Science Team have access through their respective data systems to all in-situ observations collected specifically by each side for purposes of TRMM validation;

e. Resolve science-related issues arising from both Science Teams;

f. Work to increase the level of cooperation in all research activities between the U.S. and Japan Science Teams and with other international project groups related to TRMM;

g. Define principles and procedures for all TRMM investigators to share data with one another, in order to maximize the planned scientific return from the mission; and

h. Hold a U.S./Japan meeting at least annually to review the status of activities and goals enumerated in the preceding sections 4a through 4g, and such other business as may be brought to the attention of the Joint TRMM Science Team.

Article VII - Funding and Limits of Obligation

1. NASA and NASDA shall each bear the costs of discharging their respective responsibilities, including travel and subsistence of their own personnel and transportation of their own equipment and materials, except as otherwise stated in this MOU.

2. Notwithstanding paragraph 1 above, the cost of tapes or other materials or charges required to transport the data shall be borne by the Party requesting the data, unless otherwise agreed.

3. The ability of NASA and NASDA to carry out their respective obligations in this joint program is subject to the availability of appropriated funds.

Article VIII - Data Distribution

1. NASA and NASDA shall share all TRMM data and make such data available to other users for research, operational and other uses under the terms of the EOS DEP (contained in the Appendix to this MOU). The shared data shall include all products from the NASA-provided instruments, the NASDA-provided instrument, and ground truth data used to validate the TRMM products.

2. For the purposes of the DEP, NASA and NASDA are joint Data Providing Agencies (DPAs) for the TRMM instrument data and agree that such data shall be distributed to all users without restriction, in a manner consistent with applicable laws and regulations.

3. NASA and NASDA shall each create and maintain a catalogue of TRMM data acquired and processed at their facilities, exchange this information by means of standardized formats, and make it freely available to users. NASA and NASDA shall establish interoperative capability between their respective catalogue systems.

4. The analyzed results from TRMM shall be made available to the general scientific community through publication in appropriate journals or presentations at scientific conferences as soon as possible and consistent with standard scientific practices. The publication shall indicate thereon, as appropriate, that the publication is based on results obtained from the joint NASA-NASDA TRMM mission. Each Party shall take necessary measures that NASA, NASDA or their related researchers shall provide a copy of reports and/or publications to the other Party freely. And in the event such reports or publications are copyrighted, both Parties shall take necessary steps that NASA and NASDA shall be granted a royalty free right under the copyright to reproduce, use, and distribute such copyrighted work for their purpose by the copyright holder.

Article IX - Coping with Anomaly in Development Phase and Schedule Impacts

1. Should NASDA find or be informed by NASA of an anomaly of the PR (as specified in Article IV.1), after delivery of the PR to NASA, NASDA shall repair, improve, or exchange the necessary parts for substitutes after consultation with NASA. If NASDA deems that such an anomaly may adversely affect the TRMM development schedules, NASDA shall inform and consult with NASA without delay.

2. Should NASA find an anomaly of the TRMM spacecraft that impacts PR development and operations, NASA shall inform and consult with NASDA without delay.

3. Should a delay in the development of the PR, launch vehicle services or other issue be deemed to affect adversely the TRMM development schedules, NASDA shall inform and consult with NASA without delay.

4. Should a delay in the development of the TRMM spacecraft or another issue be deemed to affect the PR development schedules and/or launch schedule, NASA shall inform and consult with NASDA without delay.

Article X - Coping with Anomaly In-Flight

1. Should NASA or NASDA find an in-flight anomaly of the PR, NASA or NASDA shall inform the other Party without delay and NASA and NASDA shall investigate the in-flight anomaly and make every effort to resolve it.

2. Should NASA find an in-flight anomaly of the TRMM spacecraft or other instruments impacting upon PR operations, NASA shall inform and consult with NASDA without delay.

3. In the event of an emergency with the TRMM mission for which immediate action is required, NASA may deactivate or change the operations schedule of PR, in accordance with the TRMM IP developed by NASA in cooperation with NASDA.

Article XI - Personnel Accommodation

1. NASA and NASDA may dispatch appropriate personnel and/or personnel of their contractors, subcontractors and/or collaborating organizations into facilities of the other Party with the approval of the other Party, when necessary to implement responsibilities under this MOU.

2. NASA and NASDA may request that the other Party dispatch appropriate personnel and/or personnel of its contractors, subcontractors, and/or collaborating organizations to participate in coordination meetings and related meetings with the agreement of the other Party.

3. The personnel of the visiting Party or the personnel of its contractors, subcontractors, and/or collaborating organizations shall comply with the internal rules of the corresponding facilities.

4. The Parties shall accommodate each other's personnel or the personnel of the other Party's contractors, subcontractors, and/or collaborating organizations, as mutually agreed.

Article XII - Necessary Equipment

1. NASA and NASDA may bring appropriate equipment into facilities of the other Party with the approval of the other Party, when such equipment is necessary to implement responsibilities under this MOU.

2. NASA and NASDA may use equipment provided by the other Party with the approval of the other Party, when such equipment must be used to implement responsibilities under this MOU.

Article XIII - Transfer of Technical Data and Goods

1. Except as otherwise provided in this article, each Party shall transfer all technical data and goods considered to be necessary by the Parties to fulfill the transferring Party's responsibilities under this MOU. NASA and NASDA undertake to handle expeditiously any request for technical data or goods presented by the other Party for the purpose of this MOU. This paragraph shall not require either Party to transfer any technical data and goods in contravention of its national laws or regulations.

2. Transfers of technical data and goods under this MOU shall be subject to the restrictions set forth in this Article. Technical data or goods not covered by the restrictions set forth in this Article, including integration, interface, and safety data (excluding detailed design, manufacturing and processing data, and associated software), shall be transferred without restrictions, except as otherwise restricted by national laws or regulations.

a. The furnishing Party shall mark with a notice, or otherwise specifically identify, the technical data or goods that are to be protected for export control purposes. Such a notice or identification shall indicate any specific conditions regarding how such technical data or goods may be used or disclosed by the receiving Party and its contractors and subcontractors, including (1) that such technical data or goods shall be used or disclosed only for purposes of fulfilling the receiving Party's responsibilities under this MOU, and (2) that such technical data or goods shall not be disclosed to or used by persons or entities other than the receiving Party, its contractors or subcontractors, or for any other purposes, without the prior written permission of the furnishing Party.

b. The furnishing Party shall mark with a notice the technical data that are to be protected for proprietary rights purposes. Such a notice shall indicate any specific conditions regarding how such technical data may be used or disclosed by the receiving Party and its contractors and subcontractors, including (1) that such technical data shall be used, duplicated or disclosed only for the purposes of fulfilling the receiving Party's responsibilities under this MOU, and (2) that such

technical data shall not be disclosed to or used by persons or entities other than the receiving Party, its contractors or subcontractors, or for any other purposes, without the prior written permission of the furnishing Party.

c. Each Party shall take all necessary steps to ensure that technical data and goods received by it under subparagraphs 2.a and 2.b above shall be treated by the receiving Party, and other persons and entities (including contractors and subcontractors) to which the technical data or goods are subsequently disclosed or transferred in accordance with the terms of the notice or identification. Each Party shall take all reasonably necessary steps, including ensuring appropriate contractual conditions in their contracts and subcontracts, to prevent unauthorized use, disclosure, or retransfer of, or unauthorized access to, such technical data or goods.

3. Termination of this MOU by either Party shall not affect rights or obligations regarding the protection of technical data and goods transferred under this MOU prior to such termination, unless otherwise agreed pursuant to Article XXII.

Article XIV - Inventions and Patent Rights

1. Except as set forth in paragraph 2 of this Article, nothing in this MOU shall be construed as granting or implying any rights to, or interest in, patents or inventions of the Parties or their contractors and subcontractors.

2. In the event that an invention is jointly made by the Parties during the implementation of this MOU, patent protection shall be requested jointly by NASA and NASDA, on the basis of equal rights, unless otherwise agreed by the Parties, taking into consideration the respective contributions of NASA and NASDA to the invention.

Article XV - Customs and Taxes

Each Party shall seek to arrange free customs clearance and waiver of applicable duties and taxes for equipment and related goods necessary for the implementation of this MOU. Such arrangements shall be fully reciprocal in accordance with the respective laws and regulations. In the event that any customs fees and/or taxes of any kind are still levied on the equipment and related goods for implementation of this MOU, after seeking to develop the necessary free customs clearance and waiver of applicable duties and taxes, such customs fees and/or taxes shall

be borne by the Party of the country levying the fees and/or taxes. These obligations are subject to the availability of appropriate funds. For the purposes of this MOU, equipment furnished by NASA to NASDA remains the property of the Government of the United States and equipment furnished by NASDA to NASA remains the property of NASDA.

Article XVI - Public Information

1. NASA and NASDA may release public information regarding their own activities under this MOU. However, NASA and NASDA agree to coordinate with each other in advance concerning public information activities which relate to the other Party's responsibilities or performance under this MOU.

2. In no event shall NASA or NASDA publish technical data or information on technical goods furnished by the other that is marked with a notice limiting use or disclosure, in accordance with Article XIII of this MOU, or information disclosing the other's inventions before patent application, without the other's prior written consent.

Article XVII - Liability

1. It is confirmed that the activities undertaken pursuant to this MOU shall be governed by the Agreement Between the Government of the United States of America and the Government of Japan Concerning Cross-Waiver of Liability for Cooperation in the Exploration and Use of Space for Peaceful Purposes (hereinafter referred to as the "U.S.-Japan Cross-Waiver Agreement"), which entered into force on July 20, 1995, the Exchange of Notes between the Government of the United States of America and the Government of Japan concerning subrogated claims, which entered into force on the same date, and additional arrangements among the Parties regarding liability issues.

2. The relevant text of the U.S.-Japan Cross-Waiver Agreement as applied to the Parties to this MOU provides as follows:

(1). For the purposes of this Article:

(a) The term "related entity" means:

(i) a contractor or subcontractor of a Party at any tier;
(ii) a user or customer of a Party at any tier; or
(iii) a contractor or subcontractor of a user or customer of a Party at any tier.

The term "related entity" may also include another State or an agency or institution of another State, where such State, agency or institution is an entity as described in (i) through (iii) above or is otherwise involved in the activities undertaken pursuant to this MOU.

The terms "contractors" and "subcontractors" include suppliers of any kind.

(b) The term "damage" means:

(i) bodily injury to, or other impairment of health of, or death of, any person;
(ii) damage to, loss of, or loss of use of any property;
(iii) loss of revenue or profits; or
(iv) other direct, indirect, or consequential damage.

(c) The term "launch vehicle" means an object or any part thereof intended for launch, launched from Earth, or returning to Earth which carries payloads or persons, or both.

(d) The term "payload" means all property to be flown or used on or in a launch vehicle.

(e) The term "Protected Space Operations" means all activities pursuant to this MOU, including launch vehicle activities and payload activities on Earth, in outer space, or in transit between Earth and outer space. It includes, but is not limited to:

(i) research, design, development, test, manufacture, assembly, integration, operation, or use of launch or transfer vehicles, payloads, or instruments, as well as related support equipment and facilities and services;

(ii) all activities related to ground support, test, training, simulation, or guidance and control equipment and related facilities or services.

The term "Protected Space Operations" excludes activities on earth which are conducted on return from space to develop further a payload's product or process for use other than for the activity in question.

(2.) (a) Each Party agrees to a cross-waiver of liability pursuant to which each Party waives all claims against any of the entities or persons listed in sub-paragraphs (i) through (iii) below based on damage arising out of Protected Space Operations. This cross-waiver shall apply only if the person, entity, or property causing the damage is involved in Protected Space Operations and the person, entity, or property damaged is damaged by virtue of its involvement in Protected Space Operations. The cross-waiver shall apply to any claims for damage, whatever the legal basis for such claims, including but not limited to delict and tort (including negligence of every degree and kind) and contract, against:

(i) the other Party;

(ii) a related entity of the other Party;

(iii) the employees of any of the entities identified in sub-paragraphs (i) and (ii) above.

(b) In addition, each Party shall extend the cross-waiver of liability as set forth in sub-paragraph (2) (a) above to its own related entities by requiring them, by contract or otherwise, to agree to waive all claims against the entities or persons identified in sub-paragraphs (2) (a) (i) through (2) (a) (iii) above.

(c) This cross-waiver of liability shall be applicable to liability arising from the Convention on International Liability for Damage Caused by Space Objects, done at the cities of Washington, London and Moscow, on March 29, 1972, where the person, entity, or property causing the damage is involved in Protected Space Operations and the person, entity, or property damaged is damaged by virtue of its involvement in Protected Space Operations.

(d) Notwithstanding the other provisions of this Article, this cross-waiver of liability shall not be applicable to:

(i) claims between a Party and its own related entity or between its own related entities;

(ii) claims made by a natural person, his/her estate, survivors, or subrogees for bodily injury, other impairment of health or death of such natural person;

(iii) claims for damage caused by willful misconduct;

(iv) intellectual property claims;

(v) claims for damage resulting from a failure of the Parties to extend the cross-waiver of liability as set forth in sub-paragraph (2) (b) or from a failure of the Parties to ensure that their related entities extend the cross-waiver of liability as set forth in sub-paragraph (2) (b); or

(vi) contract claims between the Parties based on the express contractual provisions.

(e) Nothing in this Article shall be construed to create the basis for a claim or suit where none would otherwise exist.

3. In addition, subject to national laws, NASDA agrees to indemnify the entities or persons identified in subparagraphs 2 (2) (a) (i) through 2 (2) (a) (iii) above for liability arising from claims made by the Government of Japan, as a subrogee referred to in subparagraph 2 (2) (d) (ii) above, against them based on damage arising out of Protected Space Operations. Subject to national laws, NASA agrees to hold harmless the entities or persons identified in subparagraphs 2 (2) (a) (i) through 2 (2) (a) (iii) above for liability arising from claims made by the Government of the United States, as a subrogee referred to in subparagraph 2 (2) (d) (ii) above, against them based on damage arising out of Protected Space Operations.

Article XVIII - Registration

NASA shall seek to ensure that the United States of America shall register the TRMM Observatory as a space object in accordance with the Convention on Registration of Objects Launched into Outer Space of January 14, 1975.

Article XIX - Settlement of Disputes

Any dispute as to the interpretation or implementation of this MOU shall be resolved through consultation between NASA and NASDA. The dispute shall be first referred to the NASA Associate Administrator for the Office of Mission to Planet Earth and the NASDA Executive Director in charge of the TRMM Program for resolution. Any dispute which cannot be resolved at this level shall be referred to the NASA Administrator and the NASDA President for settlement.

Article XX - Implementing Arrangements

NASA and NASDA may enter into implementing arrangements, when required, to implement this MOU.

Article XXI - Amendment

This MOU may be amended by the written agreement of the Parties.

Article XXII - Entry into Force, Duration and Termination

1. This MOU shall enter into force upon its signature by the Parties. This MOU shall remain in force until one year after data collection from the TRMM Observatory ceases, or as extended by mutual written agreement.

2. Termination of this MOU shall not affect a Party's continuing obligation under Article XVII and under Articles VIII, XIII, XIV, and XVI unless otherwise agreed by the Parties.

3. Notwithstanding termination of this MOU, the LZP data and standard products produced by each Party shall be archived by each Party for at least 10 years after the termination of this MOU, unless otherwise agreed by the Parties.

4. From the entry into force of this MOU, either Party may terminate this MOU at any time upon six months written notice to the other Party. In that event, the Parties shall endeavor to reach agreement on terms and conditions to minimize negative impacts on the other Party.

Daniel S. Goldin

For the National Aeronautics
and Space Administration
of the United States of America

Date: Oct 20, 1995

Place: Washington, DC

Takahiro Matsumae

For the National Space
Development Agency of Japan

Date: Oct 20, 1995

Place: Washington, DC

Appendix

IEOS DATA EXCHANGE PRINCIPLES

The Data Exchange Principles contained in this document establish the basis on which the Agencies listed below (hereinafter referenced as the "Agencies") will share the data from the International Earth Observing System (IEOS) among themselves and make such data available to other users. These Agencies are the four Agencies who are responsible for the Earth Observation programmes of the Space Station partners and who will act as Delegations with respect to implementation of the Principles, along with the operational organisations closely related to them. The Agencies are: the European Space Agency (ESA) along with the European Organization for the Exploitation of Meteorological Satellites (EUMETSAT) [to be confirmed]; the United States National Aeronautics and Space Administration (NASA) along with the United States National Oceanic and Atmospheric Administration (NOAA); the Japanese Science and Technology Agency (STA) along with the National Space Development Agency of Japan (NASDA), the Ministry of International Trade and Industry of Japan (MITI), the Japan Environment Agency (JEA), and the Japan Meteorological Agency (JMA); and the Canadian Space Agency (CSA).

The IEOS is currently composed of the following platforms and their corresponding Earth Observation instruments which are listed in the IEOS Implementation Plan: the NASA Earth Observing System (EOS), beginning with EOS-AM1; the ENVISAT-1 element of the ESA Polar Orbit Earth Observation Mission (POEM) programme; the NOAA Polar-orbiting Operational Environmental Satellites (POES), beginning with NOAA-N; the Japanese Earth Observing System (JEOS) beginning with the Advanced Earth Observing Satellite (ADEOS); and the NASA/Japanese Tropical Rainfall Measuring Mission (TRMM). The IEOS Agencies will endeavor to include future Earth Observation missions, as appropriate, within the IEOS framework, including application of these Data Exchange Principles.

Any Agency may propose an addition to the IEOS. With the unanimous agreement of all Agencies, a new element may be added to the IEOS and its provider may become an Agency for purposes of these Data Exchange Principles.

The following Principles address the criteria of access and utilisation of data from the above platforms. Modalities of implementation will be agreed by the parties in the IEOS Implementation Plan. Detailed Terms and Conditions for the practical execution of these Principles will be documented in the IEOS Implementation Plan and agreed by the Agencies. The definitions attached to these Data Exchange Principles are an integral part of them, and will be referred to for the correct implementation of all arrangements and cooperative activities carried out in the IEOS.

1. All IEOS Data will be available for peaceful purposes to all users on a non-discriminatory basis and in a timely manner.

2. There will be no period of exclusive data use. Where the need to provide validated data is recognized, any initial period of exclusive data use should be limited and explicitly defined. The goal should be release of data in some preliminary form within three months after the start of routine reception of instrument data.

3. All IEOS Data will be available for the use of each of the Agencies and its designated users at the lowest possible cost for non-commercial use in the following categories: Research, Applications, and Operational Use for the Public Benefit.

4. Agencies which designate users for Research Use and for Applications Use will do so through an Announcement of Opportunity or similar process. The designation will include a definition of the data to be provided. Research Users shall be required to submit their results for publication in the scientific literature and Applications Users shall be required to publish their results in a technical report and both shall be required to provide their results to the designating Agency and to the Data Providing Agency.

5. Any of the Agencies may designate national users of the respective countries or Member States of the Agencies as it deems appropriate to be given access to all IEOS data at the lowest possible cost for Non-commercial Operational Use for the Public Benefit, provided the designating Agency assumes responsibility for ensuring that all the terms and conditions for data use are met. This use will have to be reported to the Data Providing Agency on the basis of commonly agreed criteria including type, usage, and final destination of the data. Designation of users outside the national territory of the Agencies or their member states (e.g., international organisations and agencies in non-participating countries) for Non-commercial Operational Use for the Public Benefit will be done only with the agreement of the Data Providing Agency.

6. For purposes other than 3 above, the specified data will be made available in accordance with terms and conditions to be established by the Data Providing Agency.

7. Each Data Providing Agency will fulfill the data requests of the other Agencies and their designated users to the maximum extent possible. In the event that these data requests exceed the Data Providing Agency's capacity, the Data Providing Agency and the designating Agency will pursue alternative arrangements to fulfill such requests.

8. All data required by the Agencies and their designated users will be made available on condition that the recipient agrees to applicable intellectual property rights terms and conditions and/or proprietary rights consistent with these Data Exchange Principles, and ensures that the data shall not be distributed to non-designated parties, nor used in ways other than those for which the data were provided, without the written consent of the Data Providing Agency.

9. Any of the Agencies may delegate some of its functions to other entities; in which case, such Agency will remain responsible for ensuring compliance with these Data Exchange Principles.

10. Agencies will harmonise criteria and priorities for data acquisition, archiving, and purging, in consultation with other relevant organisations.

Definitions

The following Definitions apply in the context of these Principles:

Applications Use of data is a limited proof of concept study toward: 1) the solution of an applied program to demonstrate the utility of the data; or 2) the demonstration of the operational use of the data.

Data refers to original Earth observation sensor output and higher level products created from it by the Data Providing Agency as part of the standard set of products.

Data Providing Agency is the Agency which has primary responsibility for the distribution of data from a particular instrument or is the owner of such data. The Data Providing Agency will be defined in agreements between the operator of the platform carrying the instrument and the instrument provider should the two be different organisations.

Lowest Possible Cost for designated users is no more than the additional cost of resources, above the cost of the normal planned data system operations, required to fill a specific user request. These costs may include media, labour, expenses for operating and maintaining equipment, as well as delivery charges for mail or electronic transmission. The above costs should not include non-recurring costs such as research, development, and space segment capital cost. However, it may include a reasonable amount towards additional capital cost of data provision.

Non-commercial Use is the utilisation of data to provide a service for the public benefit as distinguished from conferring an economic advantage on a particular user or group of users.

Non-commercial Operational Use for the Public Benefit is the utilisation of data to provide a regular service for the public benefit as distinguished from conferring an economic advantage on a particular user or group of users. An example is the use of data to carry out a mandate of environmental observation and prediction. These activities can be carried out by national or international agencies or other entities designated by these agencies to support their public benefit mandate. Such a user may be requested by the Data Providing Agency and/or the designating Agency to provide a periodic status report back to them.

Non-discriminatory Basis means that all users in a clearly defined data use category can obtain data on the same terms and conditions, and the categories are defined in such a way that all potential users will be included in categories with access to the data.

Research Use of data is utilisation of data in a study or investigation which aims to establish facts or principles.

DEPARTMENT OF STATE

WASHINGTON

May 28, 2002

Excellency:

I have the honor to refer to the agreement between the Government of the United States of America and the Government of Japan concerning the cooperation between the National Aeronautics and Space Administration of the United States of America and the National Space Development Agency of Japan on the Tropical Rainfall Measuring Mission Program (hereinafter referred to as "the Program"), which was effected by the Exchange of Notes dated May 30, 1997 (hereinafter referred to as "the Present Agreement").

In consideration of the continuing mutually beneficial relationship between the two Governments in the field of peaceful exploration and use of outer space; taking into account the Agreement between the Government of the United States of America and the Government of Japan on Cooperation in Research and Development in Science and Technology, signed at Toronto, on June 20, 1988, as extended and amended; and reaffirming that the provisions of the Agreement between the Government of the United

His Excellency,

Ryozo Kato,

Ambassador of Japan.

DIPLOMATIC NOTE

States of America and the Government of Japan Concerning Cross-Waiver of Liability for Cooperation in the Exploration and Use of Space for Peaceful Purposes, signed at Washington, on April 24, 1995, and the Exchange of Notes of the same date between the two Governments concerning subrogated claims shall apply to the Program, I have the further honor to propose, on behalf of the Government of the United States of America, in accordance with the understanding reached recently between the representatives of the two Governments, that the Present Agreement shall be extended for a period of six years from May 30, 2002.

I have the further honor to propose that, if the foregoing is acceptable to the Government of Japan, this Note and Your Excellency's Note in reply shall constitute an agreement between the two Governments, which shall enter into force on the date of Your Excellency's reply.

Accept, Excellency, the renewed assurances of my highest consideration.

For the Secretary of State:

Anthony Nook

EMBASSY OF JAPAN
WASHINGTON, D.C.

May 28, 2002

Excellency,

I have the honor to acknowledge the receipt of Your Excellency's Note of today's date, which reads as follows:

"I have the honor to refer to the agreement between the Government of the United States of America and the Government of Japan concerning the cooperation between the National Aeronautics and Space Administration of the United States of America and the National Space Development Agency of Japan on the Tropical Rainfall Measuring Mission Program (hereinafter referred to as "the Program"), which was effected by the Exchange of Notes dated May 30, 1997 (hereinafter referred to as "the Present Agreement").

In consideration of the continuing mutually beneficial relationship between the two Governments in the field of peaceful exploration and use of outer space; taking into account the Agreement between the Government of the United States of America and the Government of Japan on Cooperation in Research and Development in Science and Technology, signed at Toronto, on June 20, 1988, as extended and amended; and reaffirming that the provisions of the Agreement between the Government of the United States of America and the Government of Japan Concerning Cross-Waiver of Liability for Cooperation in the Exploration and Use of Space for Peaceful Purposes, signed at Washington, on April 24, 1995, and the Exchange of Notes of the same date between the two Governments concerning subrogated claims shall apply to the Program, I have the further honor to propose, on behalf of the Government of the United States of America, in accordance with the understanding reached recently between the representatives of the two Governments, that the Present Agreement shall be extended for a period of six years from May 30, 2002.

I have the further honor to propose that, if the foregoing is acceptable to the Government of Japan, this Note and Your Excellency's Note in reply shall constitute an agreement between the two Governments, which shall enter into force on the date of

Your Excellency's reply."

I have the further honor to confirm on behalf of the Government of Japan the foregoing is acceptable to the Government of Japan and to agree that Your Excellency's Note and this Note in reply shall constitute an agreement between the two Governments, which shall enter into force on the date of this reply.

Accept, Excellency, the renewed assurances of my highest consideration.

For the Ambassador Extraordinary and
Plenipotentiary of Japan

His Excellency
Colin L. Powell
The Secretary of State

EMBASSY OF JAPAN
WASHINGTON, D. C.

May 22, 2008

Excellency,

I have the honor to refer to the agreement between the Government of Japan and the Government of the United States of America concerning the cooperation between the National Space Development Agency of Japan (hereinafter referred to as "NASDA") and the National Aeronautics and Space Administration of the United States of America on the Tropical Rainfall Measuring Mission Program (hereinafter referred to as "the Program"), which was effected by the Exchange of Notes dated May 30, 1997 and extended for a period of six years from May 30, 2002 (hereinafter referred to as "the Present Agreement").

In consideration of the continuing mutually beneficial relationship between the two Governments in the field of peaceful exploration and use of outer space; taking into account the Agreement between the Government of Japan and the Government of the United States of America on Cooperation in Research and Development in Science and Technology, signed at Toronto, on June 20, 1988, as extended and amended; and reaffirming that the provisions of the Agreement between the Government of Japan and the Government of the United States of America Concerning Cross-Waiver of Liability for Cooperation in the Exploration and Use of Space for Peaceful Purposes, signed at Washington, on April 24, 1995, and the Exchange of Notes of the same date between the two Governments concerning subrogated claims shall apply to the Program, I have the further honor to propose, on behalf of the Government of Japan, in accordance with the understanding reached recently between the representatives of the two Governments, that the Present Agreement shall be extended for a period of ten years from May 30, 2008.

I have the further honor to confirm that all the rights and obligations of NASDA under the Present Agreement were succeeded to by the Japan Aerospace Exploration Agency.

I have the further honor to propose that, if the foregoing is acceptable to the Government of the United States of America, this Note and Your Excellency's Note in reply shall constitute an agreement between the two Governments, which shall enter into force on the date of Your Excellency's reply.

Accept, Excellency, the renewed assurances of my highest consideration.

For the Ambassador Extraordinary
and Plenipotentiary of Japan

加藤元彦

Her Excellency
Condoleezza Rice
The Secretary of State

DEPARTMENT OF STATE

WASHINGTON

May 22, 2008

Excellency:

I have the honor to acknowledge the receipt of Your Excellency's Note of today's date, which reads as follows:

"I have the honor to refer to the agreement between the Government of Japan and the Government of the United States of America concerning the cooperation between the National Space Development Agency of Japan (hereinafter referred to as "NASDA") and the National Aeronautics and Space Administration of the United States of America on the Tropical Rainfall Measuring Mission Program (hereinafter referred to as "the Program"), which was effected by the Exchange of Notes dated May 30, 1997 and extended for a period of six years from May 30, 2002 (hereinafter referred to as "the Present Agreement").

"In consideration of the continuing mutually beneficial relationship between the two Governments in the field of peaceful exploration and use of outer space; taking into account the Agreement between the Government of Japan and the Government of the United States of America on Cooperation in Research and Development in Science and Technology, signed at Toronto, on June 20, 1988, as extended and amended; and reaffirming that the provisions of the Agreement between the Government

His Excellency,

Ryozo Kato,

Ambassador of Japan.

of Japan and the Government of the United States of America Concerning Cross-Waiver of Liability for Cooperation in the Exploration and Use of Space for Peaceful Purposes, signed at Washington, on April 24, 1995, and the Exchange of Notes of the same date between the two Governments concerning subrogated claims shall apply to the Program, I have the further honor to propose, on behalf of the Government of Japan, in accordance with the understanding reached recently between the representatives of the two Governments, that the Present Agreement shall be extended for a period of ten years from May 30, 2008.

"I have the further honor to confirm that all the rights and obligations of NASDA under the Present Agreement were succeeded to by the Japan Aerospace Exploration Agency.

"I have the further honor to propose that, if the foregoing is acceptable to the Government of the United States of America, this Note and Your Excellency's Note in reply shall constitute an agreement between the two Governments, which shall enter into force on the date of Your Excellency's reply."

I have the further honor to confirm on behalf of the Government of the United States of America that the foregoing is acceptable to the Government of the United States of America and to agree that Your Excellency's Note and this Note in reply shall constitute an agreement between the two Governments, which shall enter into force on the date of this reply.

Accept, Excellency, the renewed assurances of my highest consideration.

For the Secretary of State: